

## CLIONA RHODENSIS, NEW SPECIES (PORIFERA: HADROMERIDA) FROM THE MEDITERRANEAN

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*Abstract.*—A new species of the limestone-excavating sponge family Clionidae, *Cliona rhodensis*, is described from the Mediterranean. The sponge is vivid orange-red in color, makes small papillar and large chamber excavations, and has microscleres with an unusually great range of shape and size. Mean length and width of spicules is  $365.4 \times 10.4 \mu\text{m}$  for tylostyles,  $11.4 \times 4.7 \mu\text{m}$  for small papillar microscleres, and  $43.4 \times 5.7 \mu\text{m}$  for large choanosomal spirasters. At Rhodes (Greece) *C. rhodensis* is among the three most abundant clionids in shallow water. The species has also been found elsewhere in the Mediterranean where it has been reported previously as *C. carteri* (Ridley).

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### Introduction

Three species of distinctive red clionid sponges are known to be common in the Mediterranean (Volz 1939). *Cliona schmidti* (Ridley) is purplish red, *C. vastifica* Hancock is orange yellow to orange-red, and *C. vermicifera* Hancock is vermilion. During a recent survey of the limestone coast of Rhodos (Rhodes), Greece, one of us (RGB) noted a very common bright orange-red *Cliona* whose spiculation was very different from that of any of the aforementioned species. Further study showed the identity of the Rhodes sponge to be the same as a species described from Tunisia as *C. carteri* (Ridley) (Rützler 1973). The type of *C. carteri*, however, was since examined (by KR) at the British Museum (Natural History) (No. 1876.12.27.14) and found to be distinct from any of the Mediterranean material studied. We have now come to the conclusion that the common red *Cliona* from Rhodes represents an undescribed species.

### Family Clionidae

*Cliona rhodensis*, new species  
Figs. 1, 2

*Description.*—Color: The papillae are vivid orange-red (cf. no. 33A, color chart, Royal Horticultural Society, London), the choanosome is orange-red, too, but less brilliant. Color fades to orange-brown or yellow-brown on drying and becomes grey in alcohol.

Shape and size: Papillae are circular and discrete, fusion is very uncom-

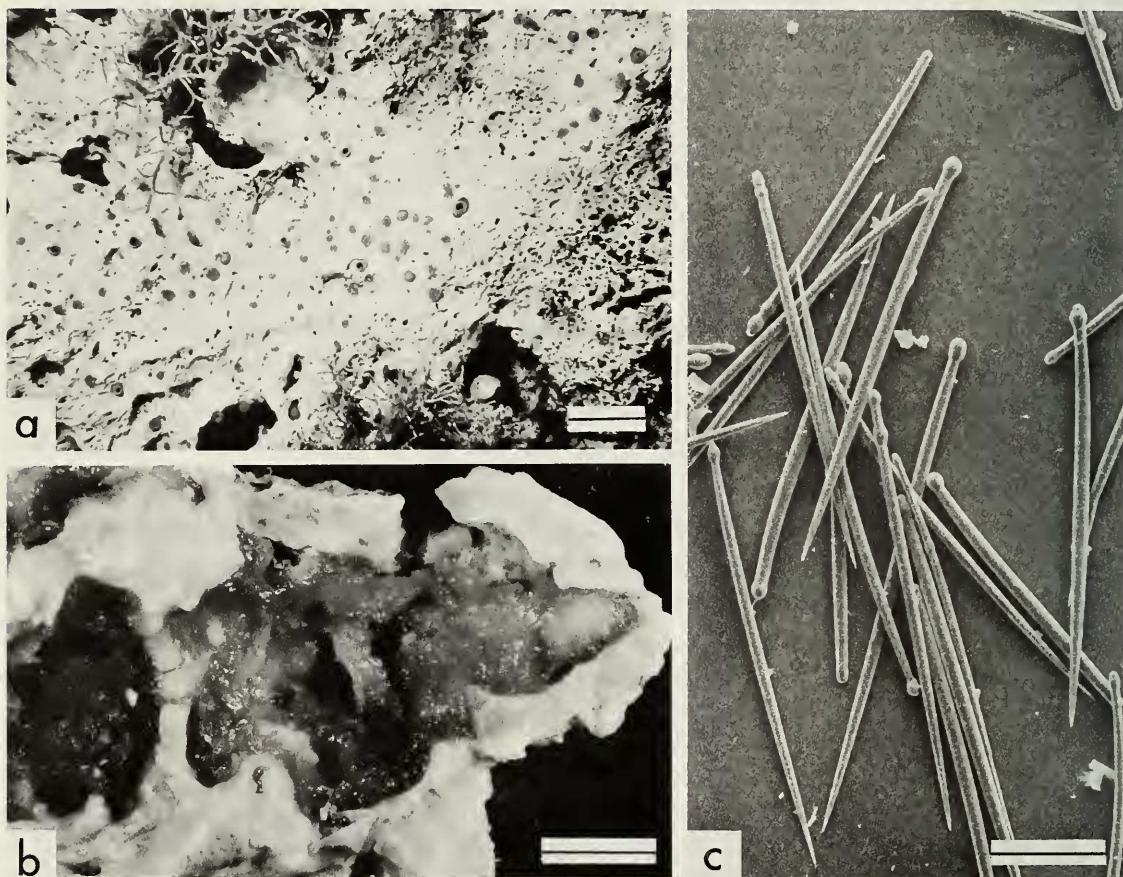


Fig. 1. *Cliona rhodensis*: a, Underwater view of papillae of a live specimen, scale bar = 2 cm; b, Two chambers of a preserved specimen exposed by breaking up substrate rock, scale bar = 5 mm; c, Tylostyles of holotype, USNM 31371, scale bar = 100  $\mu$ m.

mon, and there is no growth above the substrate (Fig. 1a). Inhalant papillae range 0.5–3.0 mm (average 2 mm), exhalant papillae 2.0–4.8 mm (average 3 mm). Excavations are large and camerate (Fig. 1b). New chambers are initiated at a distance from the next and grow subspherically until the shape is compromised by adjacent chambers. Intervening walls of substrate become increasingly thin and are eliminated here and there causing fusion of chambers. Unfused chambers measure 10  $\times$  10 mm to 12  $\times$  20 mm in cross-section but fusion can create crypts over 3 cm long. The largest crypt measured was about 2  $\times$  4 cm and considerably larger but empty ones—believed to have been bored by this species—are commonly encountered. Interchamber canals are numerous and fine, rarely exceeding 0.5 mm in diameter. Excavations resemble those of *Cliona celata* Grant (cf. Volz 1939:pl. 2, fig. 3, lower). Chambers of fresh material are filled by fairly tough tissue. The largest sponge observed measured 55 cm in diameter.

**Spicules:** Tylostyles are fusiform with a distinct head (Fig. 1c). Mucronate and subterminal modifications of the head are common. Microscleres are of

two types and size classes. Short, stout spirasters (Fig. 2b) and amphiasters (Fig. 2a) with many heavy-set compound spines (category I) prevail in the papillar tissue, long thin spirasters and some straight rods with few slender spines (category II) (Fig. 2c) are most common in the chamber tissue. Spicule dimensions for individual specimens are given in Table 1. Mean of means of all specimens measured (length  $\times$  width) is  $365.4 \times 10.4 \mu\text{m}$  for tylostyles,  $11.4 \times 4.7 \mu\text{m}$  for microscleres I (spirasters, amphiasters), and  $43.4 \times 5.7 \mu\text{m}$  for microscleres II (spirasters).

**Ecology.**—Depth: At Rhodes *Cliona rhodensis* is very abundant between sea level and 3 m depth. It is common to 9 m depth but it was not seen between 9 m and 15 m, despite numerous dives to that depth. However, the sponge looks drab at 8 m and could have been overlooked because no artificial light was available. In southern France this species may occur as deep as 40 m (Topsent 1900:98).

Habitat: The new species is estimated to be second in abundance among clionids on all limestone coasts of Rhodes; *Cliona viridis* (Schmidt) is most common, *Cliothosa hancocki* Topsent ranks third. *Cliona rhodensis* is most obvious on well-lit upper surfaces of limestone where echinoid grazing has removed fleshy algal cover. However, the sponge is equally abundant under overhangs in deeply shaded locations in shallow water. It appears less common under thick algal turf but this observation may merely reflect the greater difficulty of discovery there.

Substrate: The Rhodes localities abound in Mesozoic limestone thinly coated by lithothamnoid algae which is the normal substrate for *Cliona rhodensis*. The sponge occurs in large boulders but was never seen in rocks less than 8 cm in diameter, or in loose mollusk shells. It is also found in beachrock composed of limestone pebbles cemented by magnesium calcite. In such cases the sponge is commonly restricted to the cement between the grains producing malformed excavations.

**Distribution.**—Mediterranean: Rhodes, Greece (identically colored sponges with the same excavation pattern were seen at Crete, Monemvasia, and Corfu but no specimens were collected); Korbous, Tunisia (as *Cliona carteri*, Rützler 1973:629); S. Vito, near Bari, Italy; and Capo Caccia, Sardinia, Italy (A. Schwarz, Bochum, pers. comm.). Specimens reported from the Dalmatian Adriatic, Yugoslavia (as *Vioa viridis* var. *carteri*, Lendenfeld 1897:59), from the Gulf of Taranto and the Channel of Otranto, Italy (as *C. carteri*: Sarà 1964:306), and from the south coast of France (as *C. viridis* var. *carteri*: Topsent 1900:98) are presumed to belong to this species.

**Etymology.**—Named after Rhodos, the type-locality.

**Material examined.**—Holotype and 7 paratypes are deposited in the collection of the National Museum of Natural History, Smithsonian Institution (USNM), one paratype at the British Museum (Natural History) (BM). Holotype—8 m depth, St. Paul's Bay, Lindos, Rhodes, Greece, R. Bromley,

Table 1.—Spicule dimensions for *Cliona rhodensis*. Measurements (in  $\mu\text{m}$ ) are ranges of 10 or more spicules chosen at random, with means  $\pm$  SE in parentheses (— = no data).

		Tylostyles			Microscleres II		
		Length	x	Width	Neck diameter	Head diameter	Width
Holotype	Rhodes, USNM 31371 <sup>a</sup>	320–425 (402 $\pm$ 12)	x	7.5–13.8 (11.0 $\pm$ 0.7)	5.0–10.0 (7.9 $\pm$ 0.6)	7.5–16.3 (12.4 $\pm$ 1.0)	
Paratypes	Rhodes, USNM 31368	300–485 (394 $\pm$ 16)	x	7.5–12.5 (11.0 $\pm$ 0.6)	5.0–11.3 (8.1 $\pm$ 0.6)	10.0–16.3 (13.8 $\pm$ 0.7)	
	USNM 31369	360–490 (420 $\pm$ 7)	x	7.5–16.3 (12.4 $\pm$ 0.5)	5.0–11.3 (9.1 $\pm$ 0.4)	8.8–18.8 (14.0 $\pm$ 0.5)	
	USNM 31370	300–420 (380 $\pm$ 12)	x	5.0–12.5 (9.9 $\pm$ 0.8)	3.8–8.8 (6.6 $\pm$ 0.7)	10.0–15.0 (12.6 $\pm$ 0.6)	
	BM 1981:4:9:1	250–370 (318 $\pm$ 12)	x	2.5–12.5 (9.3 $\pm$ 1.0)	2.5–8.8 (7.0 $\pm$ 0.7)	5.0–15.0 (12.3 $\pm$ 1.0)	
	Bari, USNM 31372	270–470 (342 $\pm$ 19)	x	7.5–10.0 (9.8 $\pm$ 0.3)	5.0–7.5 (6.8 $\pm$ 0.3)	7.5–13.8 (12.1 $\pm$ 0.8)	
	Korbous, USNM 31373 <sup>b</sup>	250–370 (302)	x	6.3–12.0 (9.3)	—	11.3–15.0 (13.0)	
				Microscleres I		Microscleres II	
				Length	x	Length	x
Holotype	Rhodes, USNM 31371 <sup>a</sup>	7.3–12.9 (10.0 $\pm$ 0.5)	x	2.8–5.9 (4.9 $\pm$ 0.2)	38.7–53.5 (45.5 $\pm$ 1.8)	x	5.0–11.2 (7.5 $\pm$ 0.8)
Paratypes	Rhodes, USNM 31368	7.5–15.0 (10.8 $\pm$ 0.5)	—	—	32.5–52.5 (43.9 $\pm$ 1.9)	—	—
	USNM 31369	—	—	—	—	—	—
	USNM 31370	5.0–13.8 (9.0 $\pm$ 0.5)	—	—	27.5–57.5 (47.9 $\pm$ 3.4)	—	—
	BM 1981:4:9:1	—	—	—	—	—	—
	Bari, USNM 31372	6.3–20.0 (12.1 $\pm$ 0.9)	x	3.8–6.4 (4.5)	35.0–65.0 (42.8 $\pm$ 2.8)	x	—
	Korbous, USNM 31373 <sup>b</sup>	7.5–30.0 (15.3)	x	—	27.5–45.5 (36.8)	x	2.5–5.0 (3.8)

<sup>a</sup> Measurements of microscleres from scanning electron micrographs.

<sup>b</sup> Values from Rützler 1973.

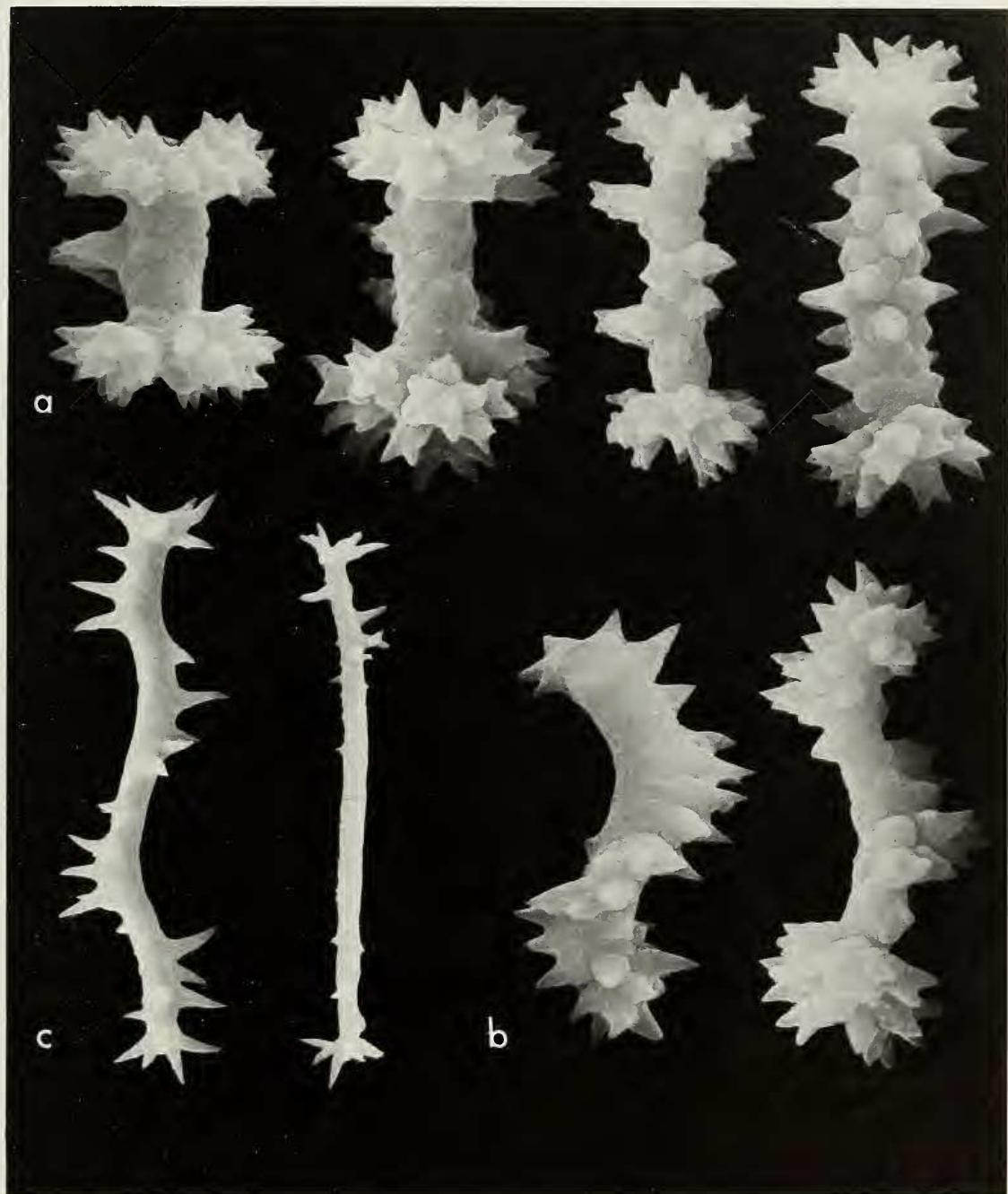


Fig. 2. *Cliona rhodensis*: Holotype, USNM 31371: a, Papillar amphiasters,  $\times 4600$ ; b, Papillar spirasters,  $\times 4600$ ; c, Choanosomal spirasters,  $\times 1500$ .

coll. 3 June 1979, USNM 31371 (dry). Paratypes—4 m depth, Porto Piccolo, St. Paul's Bay, Lindos, Rhodes, Greece, R. Bromley, coll. 27 Sept. 1977, USNM 31366 (dry); 3 m depth, St. Paul's Bay, Lindos, Rhodes, Greece, R. Bromley, coll. 3 May 1978, USNM 31367 (dry); 2–4 m depth, St. Paul's Bay, Lindos, Rhodes, Greece, R. Bromley, coll. 3 June 1979, USNM 31368

(alcohol); 0.5 m depth, north point of Ladiko south, Rhodes, Greece, R. Bromley, coll. 4 June 1979, USNM 31369 (alcohol); 3 m depth, Ladiko, Rhodes, Greece, R. Bromley, coll. 4 June 1979, USNM 31370 (dry); 1 m depth, S. Vito, South of Bari, Italy, K. Rützler, coll. 25 May 1968, USNM 31372 (alcohol); 4 m depth, Korbous, Tunisia, K. Rützler, coll. 24 June 1970, USNM 31373 (alcohol); 2 m depth, St. Paul's Bay, Rhodes, Greece, R. Bromley, coll. 9 May 1978, BM 1981:4:9:1 (dry).

*Discussion.*—Topsent (1900:98) assigned specimens of a red clionid from the Mediterranean coast of France (Banyuls, Cap l'Abeille) to *Cliona carteri* (Ridley) and agreed with Lendenfeld (1897:59) who considered this sponge to be only a variety of *C. viridis* (Schmidt). Neither author had examined type-material.

The holotype of *Vioa carteri* Ridley (BM 1876.12.27.14) is still of vivid red-purple (R. H. S. color chart 66A) color, in spite of the long storage time in alcohol. The pigment resembles that of *Cliona schmidti* (Ridley) which is purple (R. H. S. color chart 78B) and of similar stability in many organic solvents (Christomanos and Norton 1974:19). The few papillae visible on the coralline encrusted rock fragment are under 1 mm in diameter. The only visible excavation is a 12 × 2 mm gallery of confluent chambers lined with red-purple tissue. Tylostyles and spirasters (1 category only) are of the size and shape described and figured by the author of the species (Ridley 1881:129, pl. XI, fig. 2).

In spite of spicular similarities between *Cliona carteri* and *C. viridis* the distinctive pigment of the former should be sufficient to keep the two species separate, at least until more material is available. Topsent (1900:100), however, presumed the original color designation as incorrect and ignored the significance of two spiraster categories that he pointed out in his description and illustration (p. 99, pl. III, fig. 4); his sponge clearly belongs to our new species, *C. rhodensis*. Rützler (1973:629, fig. 4) followed Topsent's (1900) interpretation and described a red sponge from Tunisia as *C. carteri*. This specimen (USNM 31373) is now part of the type-series of *C. rhodensis*.

Only two clionids—*C. lobata* Hancock and *Cliona schmidti* (Ridley)—have a spicule complement comparable to that of *C. rhodensis*. Both lack amphiasters, make much smaller excavations, and are distinct in several other aspects: *C. lobata* is yellow and has much smaller and thinner tylostyles ( $200 \times 4 \mu\text{m}$ ) (Topsent 1900:70); *C. schmidti* is purple (with alcohol-insoluble pigment), has smaller tylostyles ( $260 \times 6 \mu\text{m}$ ), and much larger, thicker, and coarser spined spirasters I ( $43 \times 14 \mu\text{m}$ ) (Rützler 1973).

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